Carpinteria Avenue Bridge Replacement
Project Description

Introduction

The City of Carpinteria is proposing to replace the existing Carpinteria Avenue Bridge over Carpinteria Creek (Br. No. 51C-0172) with a new bridge at the same location. The bridge site is located on the 5400 block of Carpinteria Avenue in the City of Carpinteria, between Arbol Verde Street and Casitas Pass Road.

Carpinteria Avenue is a vital major arterial through the City of Carpinteria. Additionally, Carpinteria Avenue is the only city street crossing Carpinteria Creek that is located between the Pacific Ocean and Hwy 101. To maintain traffic and pedestrian access across the creek, the proposed bridge replacement will be constructed in stages. The proposed project will improve hydraulic capacity under the bridge, improve vehicular, pedestrian, and bicyclist safety, and will also accommodate a bicycle/pedestrian path that will pass under the bridge on the west side of the creek.

The general setting is urban with predominantly commercial and some residential uses. In addition to the bridge the proposed construction includes roadways, curbs, gutters, and sidewalks. Construction also includes relocation of the existing underground utilities from the existing bridge onto or through the replacement bridge. Overhead utilities will be either temporarily or permanently relocated to clear the site for construction.

The project is funded primarily by the federal-aid Highway Bridge Program (HBP) administered by the Federal Highway Administration (FHWA) through Caltrans District 5 Local Assistance. The City of Carpinteria will provide the local match to the federal funds. The replacement bridge will meet current applicable City, American Association of State Highway and Transportation Officials (AASHTO), and Caltrans design standards. The bridge will be replaced at the same location to match the existing roadway alignment of Carpinteria Avenue.

Project Purpose and Need

The existing bridge deck is severely deteriorated and there currently is inadequate hydraulic capacity under the bridge for flood flows. These conditions make the existing bridge substandard and have caused it to be classified as structurally deficient, making it eligible to be replaced.

The purpose of the project is to remove the structurally deficient bridge and replace it with a bridge designed to meet current structural, geometric, and hydraulic standards. The replacement bridge will also conform to local, state, and federal environmental and planning policies using HBP funds.

The project objectives are defined as:

- Improve public safety associated with the primary roadway crossing of Carpinteria Creek
- Improve flood water conveyance in Carpinteria Creek
- Avoid adverse changes in traffic circulation

- Minimize right-of-way take
- Avoid in-stream structures that may adversely affect steelhead migration
- Offset the majority of project costs through Federal transportation funding
- Minimize the Federal funding match required by the City
- Facilitate or incorporate a bike path connection to the south side of Carpinteria Avenue
- Improve pedestrian and bicycle facilities at the creek crossing
- Provide for future utility under-grounding

Project Description

Existing Bridge

Constructed in 1937, the existing bridge is a 192-ft long 5 span continuous reinforced concrete haunched tee beam with cantilevered end spans. The existing bridge is approximately 54-ft wide. It has two 12-ft-wide traffic lanes, a 12-ft-wide center lane, 3.5-ft-wide shoulder/bike lanes on each side, and 4.5-ft-wide sidewalks with 1-ft-wide railings on each side. The existing bridge has "open window" type concrete railings.

The existing bridge is founded on reinforced concrete pile extensions with unknown pile lengths and unknown abutment foundation types. In 1969 the end spans on each side were backfilled and blocked off with concrete walls resulting in a three span waterway opening. There are several utilities at the bridge, including a sewer siphon that was previously bored under the creek channel between the bridge piles.

Replacement Bridge

This section describes the proposed project and the alternatives that have been developed to meet the project purpose and need. Four alternatives are studied and include three Build Alternatives and a No-Build Alternative. The build alternatives are required to meet most of the project objectives, while avoiding and/or minimizing environmental impacts where feasible. In addition to the three Build Alternatives, four bridge width design options are considered, each of them being compatible with any of the three Build Alternatives.

The Build Alternatives being considered consist of one, two, and three span bridge alternatives, while the design width options consist of an updated bridge width (same elements as the existing bridge but with updated design width requirements for shoulder/bike lanes and sidewalks), a widened bridge width, a no median bridge width, and an open/planted median bridge width. No additional lanes are proposed in the project; the existing two lane bridge will be replaced with another two lane bridge.

The proposed project is the three span bridge alternative with the updated bridge width.

Build Alternatives

For all build alternatives, the abutments of the replacement bridge will be placed at the top of the creek banks, resulting in an overall bridge length of 200 ft compared to 192 ft for the existing bridge. All build alternatives considered have two 12-ft-wide traffic lanes, a minimum of 5-ft-wide shoulders/bike lanes on each side, and 8-ft-wide raised sidewalks with barrier railings on each side. For the proposed project, roadway work will extend approximately 230-ft to 260-ft from each end of the bridge to conform to the existing roadway.

The replacement bridge soffit elevation will be raised relative to the existing bridge to provide clearance over the expected high water elevation. All build alternatives improve hydraulics under the bridge and reduce the amount of debris collected at the bridge during storm events compared to the existing bridge.

The replacement bridge will be designed to accommodate a bicycle path under the western end of the bridge, in conformance with the City of Carpinteria General Plan goals and policies. The bike trail will be approximately 10-ft wide, and a small retaining wall will be required under the bridge between the bikeway and the creek to support the bike path and protect the bridge abutment.

Alternatives Considered

Alternative 1: Clear Span Bridge

For the clear span alternative, the bridge superstructure will be approximately 9-ft deep, which will raise the bridge deck approximately 8-ft over the existing deck elevation. This alternative will utilize pile foundations at the abutments and there will be no intermediate supports in the creek. This alternative requires approximately 390-ft to 410-ft of roadway work on each side of the bridge for the roadway approaches as well as modifications for the existing cross streets and driveways to conform to the new roadway profile. In order to accommodate the raised profile this alternative requires Arbol Verde St to be closed permanently. Additionally this alternative requires the most earthwork and has the most significant roadway and traffic impacts of the alternatives considered.

Alternative 2: Two Span Bridge

For the two span alternative, the bridge superstructure will be approximately 5-ft deep, which will raise the bridge deck approximately 4-ft over the existing deck elevation. This alternative will utilize pile foundations at the abutments and at the intermediate pier supports. This alternative requires approximately 320-ft to 340-ft of roadway work on each side of the bridge for the roadway approaches as well as modifications for the existing cross streets and driveways to conform to the new roadway profile. This alternative requires the middle support to be located in the main low flow channel of the creek.

Alternative 3: Three Span Bridge **(Proposed Project Alternative)**

For the three span alternative, the bridge superstructure will be approximately 2.67-ft deep which will raise the bridge deck approximately 2-ft over the existing deck elevation. This alternative will utilize pile foundations at the abutments and at the two intermediate piers. This alternative requires approximately 250-ft to 270-ft of roadway work on each side of the bridge for the roadway approaches as well as modifications for the existing cross streets and driveways to conform to the new roadway profile. This alternative keeps both sets of supports outside the main low flow channel of the creek, has the least amount of roadway and traffic impacts, and requires the least amount earthwork of the alternatives considered.

Width Options Considered

Bridge Width Option 1: Updated Bridge Width **(Proposed Project Width Option)**

The updated bridge width utilizes the same traffic configuration as the existing bridge, however has updated sidewalk and shoulder/bike lane widths. The updated bridge width option has a 48-ft clear roadway deck width, with an 8-ft sidewalk, 5-ft shoulder/bike lane, 12-ft lane, 14-ft center lane, 12-ft lane, 5-ft shoulder/bike lane, 8-ft sidewalk deck section. The clear roadway width of this option is approximately 5-ft wider than the existing bridge clear roadway width, with the shoulder/bike lanes being approximately 1.5-ft wider than existing and the sidewalks being approximately 3.5-ft wider than existing.

Bridge Width Option 2: Widened Bridge Width

The widened bridge width provides a much wider bridge by matching the bridge width to the adjacent approach roadway width. The widened bridge roadway clear width is approximately 14-ft wider than the existing bridge clear width, and carries a 14-ft wide shoulder across the bridge which can be used for parking. This width option has a 57-ft roadway clear width, with an 8-ft sidewalk, 14-ft shoulder/bike lane, 12-ft lane, 14-ft center lane, 12-ft lane, 5-ft shoulder/bike lane, 8-ft sidewalk deck section. This option also makes the shoulders approximately 1.5-ft wider than existing and the sidewalks approximately 3.5-ft wider than existing.

Bridge Width Option 3: No Median Bridge Width

The no median bridge width is the narrowest of the width options considered. The no median bridge roadway clear width is approximately 3.5-ft narrower than the existing bridge roadway clear width by eliminating the center lane on the bridge. This width option has a 40-ft roadway clear width, with an 8-ft sidewalk, 8-ft shoulder/bike lane, 12-ft lane, 12-ft lane, 8-ft shoulder/bike lane, 8-ft sidewalk deck section. This option makes the shoulder/bike lanes approximately 4.5-ft wider than existing and the sidewalks approximately 3.5-ft wider than existing. This option requires 8-ft shoulder/bike lanes instead of the 5-ft shoulder/bike lanes used in Width Options 1 and 2 as a result of bridge construction staging. This option removes the center lane on the bridge and the left hand turn pocket for Arbol Verde St and a business complex south of the bridge.

Bridge Width Option 4: Open/Planted Median Bridge Width

The open/planter median bridge width is the widest overall of the width options considered. The open/planted median option has two bridge sections each with a roadway clear width of 22-ft and has a 16.5-ft wide section between the two bridge sections. This area could either be open to the creek below or closed and landscaped. Each of the two bridge sections has an 8-ft sidewalk, 8-ft shoulder/bike lane, 12-ft lane, 2-ft shoulder deck section with the 16.5-ft wide section between them. This option makes the shoulder/bike lanes approximately 4.5-ft wider than existing and the sidewalks approximately 3.5-ft wider than existing. This option requires 8-ft shoulder/bike lanes instead of the 5-ft shoulder/bike lanes used in Width Options 1 and 2 as a result of bridge construction staging. This option removes all left turn traffic movements from Arbol Verde St restricting the Arbol Verde traffic movements to right turns in and out.

No-Build Alternative

Environmental review must consider the effects of not implementing the project through a discussion of the No-Build Alternative. The No-Build Alternative provides a baseline for comparing the impacts of all alternatives. Under the No-Build Alternative, Carpinteria Avenue would remain in its existing state. The existing structural deficiencies and hydraulic inadequacies would remain, resulting in an unsafe condition for traffic and pedestrian bridge users. This alternative does not meet the purpose and need of the project or the defined project objectives.

Utility Relocation

There are a number of utilities located overhead and underneath the existing bridge. Gas, water, fiber optic, and electrical lines are all supported on the existing bridge. These utilities will need to be temporarily shut off and/or relocated prior to construction. The overhead electrical lines on the northeastern side of the bridge as well as the overhead telecommunication lines on the southwestern side of the bridge will need to be relocated prior to construction. Additionally an underground sewer line is located under the creek beneath the existing pile foundations and will be protected in place and remain in service during construction.

Right-of-Way

Right-of-way impacts to adjacent parcels range from temporary construction easements, to permanent acquisition of additional right-of-way. Either a temporary construction easement or a right to enter and construct will be secured at each driveway location for work outside the City right-of-way, depending on the extent of construction work.

Detour Route/Construction Staging

During the proposed construction, Carpinteria Avenue will remain open to traffic. Bridge construction will be conducted in stages to maintain access. The first stage of construction will be to shift all traffic to the southwestern side of the existing bridge while the northeastern portion is demolished and removed. Immediately following the demolition work, the northeastern portion of the replacement bridge will be constructed. During this stage two traffic lanes, one in each direction, and the existing sidewalk on the southwestern side of the existing bridge will remain in service.

The second stage of construction will be to switch traffic to the newly constructed portion of the northeastern bridge and demolish and remove the remaining portion of the existing bridge on the southwestern side. Following the demolition work, the southwestern portion of the new bridge will be constructed. During this stage two traffic lanes, one in each direction, and one sidewalk will provide service to traffic.

The final stage of construction for the proposed project will be to make a closure pour tying the northeastern and southwestern portions together. During this stage traffic will be shifted to its final configuration with one lane, a shoulder, and a sidewalk on each side of the bridge. The center lane will also be striped at this time.

Demolition and Construction Staging

Demolition of the existing bridge will be performed in accordance with Caltrans Specifications modified to meet environmental permit requirements. Prior to construction the contractor is required to prepare and submit for approval a bridge demolition plan, including creek diversions/bypass details, that is in conformance with the environmental permits. All concrete and other debris resulting from the demolition of the existing bridge will be removed from the proposed project site and properly disposed of by the contractor.

Construction Activities

Construction will consist of the following activities in this general order:

Clearing and grubbing

Remove portions of trees, bushes, and landscaping in conflict with new construction. The areas around the corners of the new bridge would be cleared of vegetation and fencing to gain access for constructing the new bridge. The work will be within the approved project limits of disturbance.

Water Diversion

Water diversion methods are anticipated and may include the use of water bladders, sandbags, sheet piling, pipes, coffer dams, or other structural methods approved by the Engineer, City of Carpinteria, California Department of Fish and Wildlife, US Fish and Wildlife Service, and the National Marine Fisheries Service. All water divergence work will be contained within the approved project area of disturbance. The operational timeline for the stream diversion will be defined in the project permits from the resource agencies.

Bridge Demolition

The existing bridge will be demolished and properly disposed of offsite. Heavy equipment will be required to demolish and remove the existing concrete structure. The creek below will be protected from contamination and all debris generated by the demolition will be removed from the site. The existing bored sewer line beneath the creek will be protected in place.

New Bridge Foundations

The replacement bridge foundations will be supported by cast-in-drilled-hole (CIDH) concrete piles. Excavation for the abutments and piers will be approximately 8-ft to 10-ft deep. The CIDH pile construction may require the use of high density drilling slurry and/or temporary casings. If drilling slurry is used, the contractor will be required to have a contingency plan in place before drilling operations begin, in the event there is a blow out during drilling and drilling fluid is spilled into the creek. While drilling operations are underway the creek will be dewatered near the drilling operations with a creek diversion in place. Prior to construction a drilling plan will be prepared and submitted by the contractor for approval in conformance with applicable permits and environmental measures and conditions. Any drilling slurry from the CIDH pile construction will be contained and properly disposed of offsite.

New Bridge Construction

The new bridge will require falsework to be erected on temporary steel and timber supports inside the creek limits. Forms will be constructed on the falsework, and then concrete and reinforcement will be placed for the new bridge. Falsework will then be removed from the channel and concrete surfaces will be finished. Any creek diversion elements will be removed after all the concrete has been sufficiently cured and finished and the falsework has been removed.

The bridge sidewalks, barriers, and roadway approaches will then be completed. Backfill behind abutments and roadway base materials will be placed and the roadway will be prepared for final surfacing.

Contractor site access and lay down areas are identified in the project Area of Potential Effects map. Table 1 provides a description of the type of equipment likely to be used during the construction of the proposed project.

Table 1. Construction Equipment

Equipment	Construction Purpose
air compressor	bridge removal + finishing work
backhoe	soil manipulation + drainage work + bridge removal
bobcat	fill distribution
bulldozer / loader	earthwork construction + clearing and grubbing + bridge removal
compaction equipment	soil manipulation
concrete truck and pump	concrete placement
crane	placement of falsework + rebar cages + pile installation
debris bin	debris storage and containment
drill rig	pile installation
dump truck	fill material delivery + bridge removal
excavator	soil manipulation
flatbed truck	material handling and delivery
front-end loader	dirt or gravel manipulation
grader	ground leveling
haul truck	earthwork construction + clearing and grubbing
hoe ram	bridge removal
holding tanks	slurry storage for pile installation
hydraulic hammer	demolition/concrete removal
jackhammer	demolition/concrete removal
mixing tanks	slurry mixing for pile installation
paving equipment	approach roadway paving
recirculating pumps	slurry pumping for pile installation
roller / compactor	earthwork construction
truck with seed sprayer	landscaping
water truck	earthwork construction + dust control

Construction Schedule and Timing

Construction of the proposed project is anticipated to take 2 construction seasons to complete. The approximately 24 month construction period is scheduled to begin in Spring 2017.

BRLS 5397(010)
CARPINTERIA AVENUE BRIDGE (51C0172)
OVER CARPINTERIA CREEK
REPLACEMENT PROJECT
CITY OF CARPINTERIA, CA

Area of Direct Impact Map

AREA OF DIRECT IMPACT (ADI)
ONE SPAN ALTERNATIVE

AREA OF DIRECT IMPACT (ADI)
TWO SPAN ALTERNATIVE

AREA OF DIRECT IMPACT (ADI)
THREE SPAN ALTERNATIVE

PARCEL BOUNDARIES

POTENTIAL CONSTRUCTION
STAGING AREA

0 80 160ft
Scale: 1" =80'

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